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MSTA

Montana Science Teachers Association

Volume 5, No. 4 JANUARY 1987

Meet Your Officers: MSTA for 1986-1988

President Kristy Bick of Billings is a native Montanan born in Butte. A graduate of WMC, she has been teaching for 12 years, specializing in third grade for the last decade. She and her husband Don have recently welcomed son Matthew, born June 17, 1986, into the family. Kristy's other interests are aerospace education, Lambda ADK (honorary teachers sorority of which she is also president) and church activities.

President-elect Richard Micheletto of Missoula was born in Savage, Montana, an undetermined number of years ago. He has been teaching science for 18 years. Currently he directs the 7th-8th grade program of Project Excel for School District #1, using science as a vehicle for problem solving and stimulation of higher level thinking skills. Also active as an assistant Scoutmaster, "Mitch" likes running, fishing and hunting.

Secretary Bob Makela has gained national recognition as a "dinosaur man" and colleague of Jack Horner who uncovered the Montana state fossil, *Maiasaura*. Bob has been teaching science for 17 years. As THE science teacher at Blue Sky High in Rudyard, MT, he teaches chemistry, physics, biology, advanced biology and computer science. He is currently putting together an article on "Classroom Dinosaur Museum."

Treasurer Gil Alexander came from Texas to study at the University of Montana and worked as a geologist for the Montana Highway Department in Helena before beginning a teaching career in the Helena school system. He is Science Department Chairperson at Helena High where he teaches earth science and geology. Gil and his wife Marilyn, chemistry teacher at Capital High, run a summer program for gifted and talented science students. They also have recently received a federal funded "Excellence in Education" grant to provide a 12-day residential science camp to give field experience to elementary teachers. (See article in this newsletter.)

District Directors Richard Menger of Baker, David Puyear of Rudyard, Doug Schenkle of Helena, Linda Robinson of Billings, Steve Schumacher of Malta, and Russ Hartford of Kalispell will be featured in the next newsletter.

Craig Kuchel Travels as 1986 Presidential Honoree

Craig Kuchel, biology teacher at Florence-Carlton High School in Florence, Montana, was selected in October for national honors by the "Presidential Award for Excellence." The fourth Montana teacher so honored, Kuchel and his wife, Joan, went to Washington, DC for meetings centered on problems of science and mathematics teaching.

Craig spent a full week in Washington to allow one day for sightseeing at the Smithsonian. The rest of the days were scheduled from 7 a.m. to 11 p.m. with lectures, demonstrations, idea sharing, interviews with Vice President Bush, and talks by people from the National Science Foundation. The entire program was funded by NSF and administered by the National Science Teachers Association.

Florence-Carlton School will benefit from $5,000 awarded for science equipment. Craig also received numerous personal gifts from private corporations, such as a programmable calculator, microcomputer, science encyclopedia and other books and periodicals.

Kuchel and his wife found the attention given to teachers "very exciting." Craig takes particular satisfaction in noting that "Montana science programs are right up there with everyone else's." He also has advice for other teachers considering the tedium of filling out lengthy forms early in 1987 in order to compete for the 1987 awards. "More of you should get involved in this program," Craig urges.

Application forms for 1987 will be available from Bob Briggs, OPI, Helena, MT 59620 or Debbie Watkins of NSTA, (202) 328-5800.

Montana Science Teachers Newsletter is published quarterly by the Montana Science Teachers Association and the State Office of Public Instruction.

Editor is Doris Simonis, School of Education, University of Montana, Missoula, MT 59812. Send her your activity suggestions, comments, articles, and news about science teachers and science education you'd like to share.

Subscription is $8.00 annually. Send your check, made out to MSTA, to Gil Alexander, Treasurer, MSTA, Helena High School, Helena, MT 59601.

Missoula Science Teacher Completes Fulbright Tour

by Tom Facey
Meadow Hill Middle School
Missoula, Montana

Making the transition from an eighth grade science teacher in Missoula, Montana, to teaching science in a comprehensive secondary school in London, England, as a Fulbright exchange teacher, was a lot of fun...and a tremendous amount of change.

The school day at the Kelsey Park School for Boys (over half of the English schools are sex-segregated) consisted of four 70-minute periods. The English school year ran from the beginning of September to late July; however, in school calendar days it was only about 10 school days longer than a Montana school year. Boys ranging from 11 to 18 years old attended Kelsey Park, which had an enrollment of 950.

I taught sixth and seventh grade science classes which met twice a week. In the eighth grade, boys took one period each of physics, chemistry and biology every week. I taught two periods of physics and two periods of biology to the eighth graders.

In most English schools students are tracked according to ability. Starting with the ninth grade, students are required to take a minimum of one science course and may take as many as three science classes.

The headmaster in English schools has a great deal of autonomy concerning the operation of the school. This freedom includes the direction of the curriculum, expenditure of money and placement of personnel. Kelsey Park was very strong in the sciences, especially physics, electronics and the application of science/technology to manufacturing fields. The ninth graders could select among physics, biology, chemistry, electronics, applied sciences and science/technology to fulfill their course requirements.

The classes that ninth graders selected were a two-year course of study that culminated in an exam. Courses were guided by a very specific syllabus that was published by a private testing board which also published the test. There were several testing boards that a tutor could select to act as a curriculum guide. The culmination of the course would be an exam that, along with some tutor-graded course work, would determine a grade for the two-year course. Approximately 15 percent of the 16-year-olds would continue at Kelsey Park to study for another series of exams. These courses would last two years and would be the equivalent material of a freshman year at a Montana college. Entrance to the different colleges and universities would be based on these test results.

I taught two classes of ninth grade physics, each meeting for two periods a week, and one class of tenth grade biology, also meeting twice a week. Along with my science duties, I taught a word processing class and two periods of P.E. My teaching load was typical for English science teachers. What allowed me to survive with so many preparations were the science technicians that were at Kelsey Park. In the mid 1960's, through a nationwide program, science teachers were given the help of technicians in their disciplines. Kelsey Park had a technician for biology, one for chemistry and a third for physics/electronics. The technicians at Kelsey Park helped me plan lessons, set up experiments, prepare solutions and much more.

In terms of equipment, Kelsey Park had as much and maybe more than a Montana school of comparable size. This was only because the science department was managed efficiently in recent years and not because the local educational authority was lavishing money on science or education in general. When I taught in England during the 1985-86 school year, the morale of English teachers was probably at an all time low. There is not enough money spent on education in England. The English teachers know this and they feel powerless to correct the situation. Salaries were approximately one-half of Montana salaries; the physical condition of the buildings was appalling; and, of the 10 academic classes I taught, only two did not have to share books.

The biggest change I had to deal with was meeting with a class once or twice a week. With the class periods 70 minutes long, each class meeting was an individual unit and did not necessarily connect with what was taught at the previous meeting.

Being able to take classes with excellent lectures at the Royal Academy of Science and to walk in front of Buckingham Palace on the way to the Academy were highlights of my year as an exchange teacher. The Fulbright experience is one that I would gladly have again. In seeing how other teachers cope, I have gained insight into my own career and potential for development.

Resources for Teachers...

Preventing AIDS Through Education is both title and objective of a new teaching guide distributed by Minnesota Curriculum Services Center, 3554 White Bear Avenue, White Bear Lake, MN 55110 (1-800-652-9024) for $4.00. Ask for publication B960. It includes instructional activities for elementary, junior high and high school students; transparency masters; and bibliography of other printed and audiovisual media available to educators.

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The U.S. Department of Energy has issued a middle school (grades 6-8) teachers' curriculum kit on nuclear energy called "The Harnessed Atom." A limited number of student and teacher editions are available free on a first-come, first-served basis. Write on school letterhead, stating the grade level you teach to: The Harnessed Atom, U.S. Dept. of Energy, 300 Tulane Ave., Oak Ridge, TN 37830.

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Re-Actions, a teachers' newsletter with background information on peaceful uses of nuclear sciences and activity ideas for the classroom, is another free source. Requests should be on school letterhead and mailed to the American Nuclear Society, 555 North Kensington Ave., LaGrange Park, IL 60525. Recent issues have included articles on the Chernobyl accident, food irradiation, nuclear waste and career opportunities in science.

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Free "Classroom Demonstrations of Wood Properties" (elementary to high school suggestions) is available from Forest Products Labs Publications Dept., 1 Gifford Pinchot Drive, Madison, WI 53705.

FREE cards with periodic table on one side and table of atomic weights on the other (limit 250 cards) are available from Allied Signal Corp., Chemical Advertising Sector, Columbia Road and Par Avenue, Morristown, NJ 07960.

* *

Free "101 Ways to Teach About Exponential Growth" is distributed by Tri-County Teacher Evaluation Center, 426 School Street, Sebring, FL 33870.

A semi-annual newsletter, *Out of the Blue,* for BSCS blue version users is available **free to all biology teachers.** Each issue focuses on one topic, giving background information, teaching suggestions and possible labs. Put yourself on the mailing list by sending your request to: D.C. Heath, 125 Spring Street, Lexington, MA 02173.

Elementary school teachers will appreciate *Kaleidoscope,* an 8-issue/year newsletter of interdisciplinary activities using science concepts in the classroom. Subscription is $10/year from: Wisconsin Center for the Advancement of Science Education, 1922 University Ave., Madison, WI 53705. (Aimed for teachers K-3.)

Elementary Teachers Science Camp

Helena School District #1 was recently awarded a federal Excellence in Education grant which will be used to offer science training to twenty Montana elementary teachers.

The camp will be a 12-day residential camp with long hours and hard work that will be available for four hours graduate credit through the University of Montana Science Education Department. It will begin on Monday, June 15, 1987 and will end Friday, June 26, 1987.

The camp will be located on Canyon Ferry Lake at the Community Center located in Canyon Ferry Village near the dam. During the camp, teachers will get a chance to review current elementary science software; search for sapphires; see how two hydroelectric facilities generate power; search for fossils; visit an observatory; learn observational astronomy; experiment with elementary level chemistry projects; collect microbiological specimens and learn to identify them; work with maps, air photos and sonar; collect lake temperature information; go on field trips for bird watching, plant collecting and fish collecting.

Those who complete the course will be expected to participate in inservice training programs back home to produce a workshop for the Montana Science Teachers Association annual meeting and to provide lesson plans to be incorporated in a volume to be made available to the University of Montana Library.

Ten applicants will be chosen from the sponsoring district (Helena School District #1) and ten from throughout the remainder of the State of Montana.

Helena elementary teachers interested in applying should notify their building principal or Erv Winslow, Director of Curriculum, Helena, MT. Elementary teachers from other parts of the state are invited to submit requests for applications to Bob Briggs, Science Specialist, Office of Public Instruction, State Capitol, Helena, MT 59620.

Successful applicants will receive an award which will cover tuition for the camp; tuition for credits from the University of Montana; and food provided while in residence. Successful applicants will be urged to bring campers or trailers if they have them available. Housing may not be available. If not, tents will be available for those not having campers.

Further information or application requests may be obtained from Gil Alexander, Helena High School, 1300 Billings Ave., Helena, MT 59601 or by phoning 443-2745 in the evenings.

Montana Academy of Sciences

The 1987 Annual Meeting of the Montana Academy of Sciences will be held at Eastern Montana College April 3-4, 1987. Plans are now under way to make this a memorable meeting. Dr. Jerry Hurley, Physics Dept., and Dr. Tom Zwick, Earth Sciences Dept. at Eastern Montana College, are in charge of organization. A symposium on noxious weeds, a formal session to be held April 3 in conjunction with the meeting, is being considered.

If you would like to present a paper concerning any topic in science or science teaching, please contact Linda Robinson, Vice Chairman for the Teaching of Science and Mathematics, 4408 Pine Cove Road, Billings, Montana 59106.

Every Teacher A Researcher (ETR) Program

The ETR Program is presented by the National Science Teachers Association and is designed to bring research about teaching into the classroom. NSTA feels that good research on teaching begins with real teachers in real classrooms, and the ETR Program is an attempt to put that idea into practice. Some of the projects included in the program are:

1) Ideas for small-scale research projects which could be performed in the classroom or in conjunction with other teachers in a school, district or area.

2) Descriptions of larger scale research projects for groups or schools.

3) Readings and bibliographies on topics of interest.

4) Details about the "ETR Research Network"—a plan for sharing teacher-generated research at the NSTA conventions.

An informational packet has been ordered for the Region V meetings and will be discussed by participating members. Anyone who is interested in being a part of some science research in Montana should contact Linda Robinson.

Physics Teachers Meet for Lab Workshop

November 10 was a unique day in northeastern Montana. On that day, over 20 physics teachers gathered at Glasgow High School for a one-day workshop on demonstrations and labs. The workshop was presented by Gordon Hahn, physics teacher at Glasgow High School. Hahn is a member of the American Association of Physics Teachers (AAPT). Last summer he attended two workshops on lab demonstrations and experiments. One was sponsored by the AAPT and the other by the National Science Teachers Association (NSTA). Hahn took materials from these two workshops and assembled an impressive demonstration of his own.

The workshop included dozens of ideas for physics demonstrations. These included measuring the acceleration of gravity by dropping golf balls and throwing raw eggs at a sheet to illustrate uniform acceleration. Near the middle of the day Hahn demonstrated how to lie on a bed of nails and how to walk on broken glass. The local newspaper sent a photographer to record the event.

Another topic presented was industrial testing. Workshop participants received an apparatus to test the strength of plastic films and an apparatus to test the hardness of surfaces. Presentations of laser applications and a "licorice half-life" demonstration were some of the high points of the afternoon.

Workshop participants also had a chance to share ideas and to present their own demonstrations. Physics Olympics events were also discussed.

Overall, this was a great workshop! We all need to keep alert for chances like this. Gordon Hahn plans to present one more workshop this year. Since people came from Havre, Malta, Lewistown, Plentywood and several other communities for this one, I think his next one should be just as well attended.

Steve Schumacher
Malta High School
Malta, MT

Dinosaurs in the Classroom

After over 20 years of research and personal involvement with paleontology in Montana, Bob Makela of Blue Sky Schools in Rudyard is in the process of developing a series of activities designed for use within the classroom. Bob is designing the activities in such a manner that they can be used as a continuing unit or as a series of activities which can be used to fill separate free-time blocks that occur in every classroom, during different times throughout the year. Teachers interested in this type of teaching approach can contact Bob at the following address: Bob Makela, Blue Sky Schools, Box 129, Rudyard, MT 59540.

Bob is willing to send information and actual materials to teachers who would be willing to return a critique to him after their use of the materials.

Positive Encouragement for prospective teachers. Five hundred Illinois students who rank in the top 15 percent of their high school graduating classes are awarded $1500 annual college scholarships. In return, the students agree to teach in an Illinois school for 4 years.

Individual School News

Blue Sky Schools:

Students in Blue Sky's Junior High science program are currently involved in a "Bridge Building Contest" in which students must research, design and build actual bridges from wooden popsicle sticks. The project has generated a great deal of enthusiasm amongst the student body with students enlisting the help of university engineers and state highway officials. The students' final products will be tested for strength on December 20th during a community event.

Sunburst

The Sunburst science olympiad team placed 3rd at the State Science Olympiad at Montana State University in Bozeman. Members of the Sunburst team were: James Nutter, Ernie Lee, Cristi Heavirland, Amy Ryan, Lowell Bye, Jason Samsal, Gina Stivahtis, Donica Holeman, Ray Peltier, Kurt Bush, Ron Reighard, Jay Halverson, Nate Clark, Tom Nau, Rob Habets.

Ernie Lee and Nate Clark won gold medals in anatomy and physiology events, and Amy Ryan and Cristi Heavirland won silver medals in the science password event.

Other events taking place at Sunburst:

1) Eight students have submitted student research papers to the state department for the Junior Science Symposium. They are Amy Ryan, Ernie Lee, Cristi Heavirland, Kurt Bush, Lowell Bye, Gina Stavahtis, Missy Taylor and Tom Nau.

2) A number of students are working on proposals for the space station competition sponsored by N.A.S.A.

3) Twelve students are working on research projects to exhibit at the Montana State Science Fair in April.

Sunburst instructors are Larry Fauque and Mike Weller.

Big Sandy

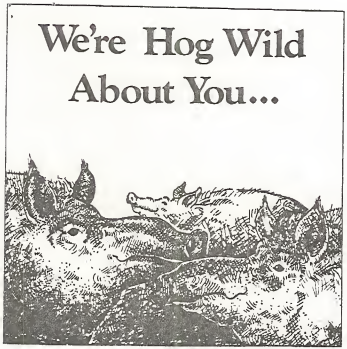
Big Sandy science students also attended the State Science Olympiad in Bozeman with the junior high team placing 4th. Results of the events were: 1st place in Science Bowl: Jennifer Bold, Debbie Pribyl and Keirn Grubb. Third place in Mystery Substances was Brandon Jappe. Third place in Anatomy/Physiology were Colleen Keller and John Cavitt. Third place in Rocks was Karen Lund.

Other events taking place at Big Sandy:

1) Four seniors recently submitted project papers to be judged for the Intermountain Junior Science and Humanities Symposium.

2) Seniors are putting the finishing touches on their project papers for the McGraw and Westinghouse Scholarships.

3) John Cavitt, International Science and Engineering Fair winner for the past two years (4th Grand 1985 and 1st Grand 1986 in Microbiology) was selected as Big Sandy's Centennial Scholar. The student selected as Montana's Centennial Scholar will visit the National Institute of Health at Washington, D.C.



Send us your news and views about science teaching to: MSTA Science Newsletter, c/o Doris Simonis, School of Education, University of Montana, Missoula, MT 59812.

Regional Meetings in Billings Attract Region V Teachers

Members in Region V are again organizing regional meetings to be held once a month. MSTA members residing in Yellowstone, Wheatland, Golden Valley, Musselshell, Sweet Grass, Stillwater, Carbon, Treasure and Big Horn counties are welcome to attend the meetings.

The purpose of the meetings is to disseminate ideas for science education at all levels and improve communication between teachers of science. Teachers of all levels who would like to share ideas for science teaching are welcome.

The last meeting was held Monday, December 8, at Central Heights Elementary School in Billings. Items on the agenda included:

1) Setting dates for programs for future meetings.
2) Sharing ideas from members.
3) A demonstration of indicators by Gerald Raab and Linda Robinson.
4) Discussion of possible weekend field trips.
5) Discussion of possible participation in NSTA research program by members.

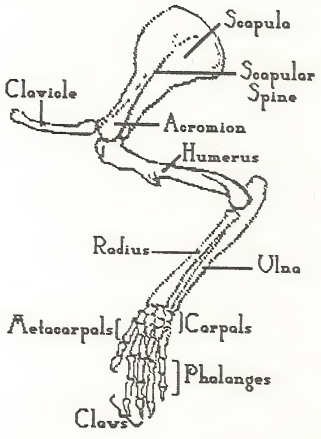
If you live in one of the counties of Region V and are unable to attend meetings but would like to be informed of the proceedings or would like to participate in some way, please contact Linda Robinson, Regional Director, 4408 Pine Cove Road, Billings, MT 59106.

Bag of Bones

by Richard Menger
Baker High School
Baker, MT 59313

Frequently I'm asked for the technique that I've used to mount the demonstration skeletons used in my classroom. This technique was modified from Dr. Hans Gruneberg, author of *The Genetics of the Mouse*, and is the most time conservative and effective way I've seen anywhere. It employs the use of a proteolytic enzyme, papain, which is derived from the tropical papaya fruit. This enzyme may be purchased from Difco Laboratories, Box 1058, Detroit, MI 48232 and costs $50.30 for 500 grams. This quantity lasts a long time. The procedure is recommended for any size animal which is medium-dog-size or smaller. This size is restricted only because of the size of Zip-Lock bags available and display requirements.

First the specimen is completely skinned and eviscerated. Then section the body into head, limbs, trunk and tail. While sectioning, also remove the larger muscles from legs, and the tongue, eyes and brain from skull. No scraping is necessary, since the proteolytic enzyme will take care of the rest. After rinsing in tap water, place each section in an appropriate sized Zip-Lock bag, which can be either quart, one gallon or two gallon size, making sure to label each bag. A section might be similar to the diagram below and be labeled left shoulder girdle and arm. Sectioning and bagging will save you an enormous amount of time later because you won't have to sort one big pile of bones.



Each section is covered within the bag with tap water and double boiled for 10 minutes in a large kettle. You should now have 5-6 bags boiling at the same time. Carefully pour off the boiling water and cover again in the same bag with a 5 percent aqueous solution of sodium chloride. To this solution add a good pinch of papain (amount depends on size of skeleton), zip bag closed, shake and place in an incubator at 38-40°C for 24 hours.

The next day shake each bag again vigorously to loosen any tissue still remaining on bones. The bones are rinsed once or twice in tap water while still in bag to free bones of any tissue still remaining. Great care should be taken not to lose any of the little bones as the solutions are poured off. Do not allow the bones to dry with tissue still adhered to them. Keep all bones submerged while any solution is used in bags.

The bones are then bleached by placing them in hydrogen peroxide in the same bag for about 5 hours. Placing the bags during this time in direct sunlight will hasten this portion of the procedure.

Then, after pouring off the hydrogen peroxide solution, replace with acetone in the same bag for 12-24 hours. This will remove any grease and fat and prepare the bones better for gluing. Following this, each bag is emptied onto paper toweling and allowed to dry.

Students may either assemble the skeleton in a standing position with wire and Duco contact cement (Devcon or Dupont works best, because these are clear) or lay them out in order on black art paper, gluing them in place with the contact cement. Labeling can be neatly done with white ink. Some students even like to protect their bones with wood frame and glass plate. Any bones connected in the wrong place can be loosened with acetone.

Besides the satisfaction a student gets by using this technique, it may be applied to research problems such as (1) effects of vitamins, hormones, and respiratory gases on bone development; (2) rates of bone growth, (3) strain skeletal differences, and (4) genetic variations.

This *Bag of Bones* technique may be used for the preparation of any skeleton, but larger animals require more papain and larger Zip-Lock bags, and have to stay in the various solutions for longer periods of time. My students have done animals ranging from shrews to coyotes, and everything between. You'd be surprised how fast a collection grows and the time saved by using *Bag of Bones*.

EDITOR'S NOTE: Most meat tenderizers (Adolph's, Schillings, Durkee's, etc.) are combinations of papain and salt. I have used them successfully to clean small-boned animals (lizard, birds, mice) by boiling them in a diluted solution of tenderizer and water.

Exemplary Practices Sought

Applications for consideration by the COSMOS Corporation project on exemplary practices in science and mathematics education (8-12) are invited from educators involved in district programs or classroom efforts that demonstrate new science education techniques and curriculum. The NSF-supported project involves the cooperative efforts of AASA, NASS, NCTM, and NSTA. For application forms write to: NSTA, c/o Executive Director, 1742 Connecticut Ave. NW, Washington, D.C. 20009.

This is for your information. Please clip out and save.

1986-87 Officers and Directors

Kristy Bick, President
Huntley Project School
Worden, MT 59088
967-2540

Richard Micheletto, President-Elect
Jefferson Elementary School
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Missoula, MT 59801
453-5863

Gil Alexander, Treasurer
Helena High School
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Helena, MT 59601
449-6325

Bob Makela, Secretary
Blue Sky High School
Rudyard, MT 59540
355-4460

Bob Briggs, Exec. Secretary
Office of Public Instruction
State Capitol
Helena, MT 59620
444-4439

Ken Price, Past President
Helena High School
1300 Billings Ave.
Helena, MT 59601
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(Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Ravalli, Sanders)

David Puyear, Region II Director
Blue Sky Middle School
Rudyard, MT 59540
397-3210
(Blaine, Chouteau, Cascade, Fergus, Glacier, Judith Basin, Hill, Liberty, Pondera, Teton, Toole)

Steve Schumacher, Region III Director
Malta High School
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654-1331
(Daniels, Garfield, McCone, Petroleum, Phillips, Roosevelt, Sheridan, Valley)

Doug Shenkle, Region IV Director
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Helena, MT 59601
449-6325
(Beaverhead, Broadwater, Deer Lodge, Gallatin, Jefferson, Meagher, Madison, Lewis & Clark, Park, Powell, Silver Bow)

Linda Robinson, Region V Director
Arrowhead Elementary School
2510 38th St. West
Billings, MT 59101
656-5770
(Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Treasure, Wheatland, Yellowstone)

Richard Menger, Region VI Director
Baker High School
Baker, MT 59313
778-3329
(Carter, Custer, Dawson, Fallon, Powder River, Prairie, Richland, Rosebud, Wibaux)

Hello Teachers of Science:

I am hoping that everyone has a good year of teaching science. I wish everyone would contribute good ideas that you have used in your classroom into the MSTA newsletter. An exchange of ideas would make for a more productive and interesting program in science. I am hoping that we can broaden our ideas and programs throughout our MSTA association.

Remember, MSTA is for all teachers of science—elementary, middle school, junior high, high school and college. "United We Stand, Divided We Fall."

Good luck and I wish you all the success in this school year.

Remember to join MSTA. Dues are $8.00 per year. Send to Gil Alexander, MSTA Treasurer, Helena High School, 1300 Billings Ave., Helena, MT 59601.

Kristy Bick
MSTA President

Dear MSTA Members,

The last reporting of the MSTA account was made by the treasurer through the January 1986 MSTA newsletter. At that time, MSTA had a balance of $3,740.53. Since that time MSTA has taken in $762.00 and has expended $694.35. We had one dues check which was returned for insufficient funds for a loss of $8.00 and have gained $143.14 in interest at a rate of 5.25 percent for a balance of $3,992.53 as of October 15, 1986. The treasurer has $16.00 in undeposited checks and anticipates more from the fall '86 MSTA Conference. A summary of monthly activity since the last reporting date is included.

Sincerely,

Gil Alexander
MSTA Treasurer

	Deposits	Checks	Interest	Balance
Jan. 86	98.00 Dues	#134 200.00	3.77 Dec.	3643.39
		#135 13.40	14.49 Jan.	
Feb. 86		#136 10.00	14.51	3597.11
Mar. 86			14.51	3611.62
Apr. 86	40.00 Dues		11.97	3623.59
			3.67	3667.26
May 86		8 bad check	14.77	3674.03
June 86		#139 100.00	17.69	3591.72
July 86		#138 139.70	14.95	3466.97
Aug. 86	264.00 Dues		16.07	3747.04
Sept. 86			16.74	3763.78
Oct. 86	184.00 Dues	#140 131.25		3992.53
	176.00 Dues			

P.S. It looks like we will clear about $1500 from the MSTA Conference for 1986.

MSTA General Meeting
October 16, 1986

The general meeting of MSTA was called to order by president Ken Price at 3:30 p.m.

The treasurer's report was given by Gil Alexander. Motion by Richard Menger to accept report. Seconded by Russ Hartford. Motion passed.

New Business

Myra Miller made the motion to pay our general session speaker $250. Seconded by Kristy Bick. Motion passed.

President Ken Price then acknowledged several contributions to science teaching by individuals belonging to MSTA. They are Craig Kuchel, *Science Teacher of the Year* and Richard Menger *Biology Teacher of the Year.* Well deserved awards to fine teachers. It is a pleasure to work with people such as these.

Ken then introduced Kristy Bick as our new president and turned the rest of the meeting over to her.

Kristy's first action was to present awards to each of the board members who served MSTA during the past term. She then introduced the potential presidential-elect candidates and asked for motions from the floor for any others.

Those nominated were: Richard Menger, Gil Alexander and Richard Micheletto.

Each candidate then told briefly what they would be able to add as president of MSTA.

A vote was then taken and Richard Micheletto was elected as our new president-elect.

Nominations were then opened for treasurer. Gil Alexander said he would like to run for that office again. No other nominations were forthcoming.

Nominations were then opened for secretary. Bob Makela said he would like to run for that office again. No other nominations were forthcoming.

Nominations for region four were as follows: Doug Schenkle, John Graves and Diane Cashell.

Nominations for region two were Dave Puyear.

Nominations for region six were Richard Menger.

New officers of MSTA are: Treasurer, Gil Alexander; Secretary, Bob Makela; Region 2 director, Dave Puyear; Region 4 director, Doug Schenkle; and Region 6 director, Richard Menger.

Old Business

Linda Robinson gave a report about the ongoing project to involve elementary teachers with science projects. The past year has not been productive but she would like to try it for one more year with some new ideas.

Doris Simonis asked that more input be from members of the MSTA for our quarterly newsletter. Doris has done a great job of organizing this letter in the past but could sure use some help in the future. Let's all work toward this end.

Bob Briggs reported on the B.E.S.T. program which was submitted to N.S.F. in the form of a grant last year. They refused it as written but made several suggestions which would improve its chances of acceptance this year. These were finished and the proposal has been resubmitted. We are all hoping this will pass this time.

The MSTA conference for 1987 will again be with MEA in Billings.

A motion was made by Gil Alexander to allow a stipend of $300 for our MSTA president to attend the National Science Teachers Convention in Alaska as our representative. Seconded by Ken Price. Motion carried.

Several door prizes were awarded next. Those receiving door prizes were: Russ Hartford, Linda Robinson, Kristy Bick, Steve Schumaker, Bernie Allen.

Meeting adjourned at 4:45 p.m. October 16, 1986.

Bob Makela
Secretary

Writing Customized, Illustrated Software in BASIC

by Don Berg
Sentinel High
Missoula, MT 59801

Introduction

If one has a reasonable knowledge of programming in BASIC and has access to one of the illustrating programs such as **Mousepaint**, one can create original, inquiry programs for students to use. While the following demonstration is intended for students in biology, the technique is applicable to any discipline. The program below is written for the Apple II family of computers in DOS 3.3 or ProDos.

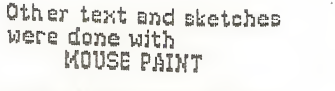
Getting Started

While not essential, it is highly recommended to work with a line editor such as Beagle Bros. Global Program Line Editor when entering a program in AppleSoft. Pictures such as that in Figure 1 (title page for Hello Program) are drawn with MousePaint and some lettering is also done with Beagle Bros. Apple Mechanic. Beagle Bros. requires that credit be given to them for the use of their software as in Figure 2. Colors can be used to suit the author's preference for text or drawings. Manuals provided for MousePaint and for Apple Mechanic are fairly easy to read and discussion of the use of these programs is not used here.

Because the MousePaint program creates binary files in ProDos, one must convert the files to DOS 3.3 using the ProDos utility disk or other converter if one's Applesoft program is to be in DOS 3.3.

Figure 1. Title Page

Figure 2. Credits



AUTHOR: DON BERG, SENTINEL HIGH SCHOOL
MISSOULA, MT 59801
JANUARY, 1986

Exploring the Program

Study Figure 3 which is a listing of the HELLO programs. File commands and specific information about loading binary files and displaying pictures are described. The companion program, "TAGGED" operates similarly.

Line 20 provides for the Key to operate DOS.

Line 30 bloads the picture in Figure 1 which is part of the Hello Program. This HIRES picture is then displayed by line 180 as accessed by the GOSUB in line 40.

Line 60 displays the upper part of the HIRES screen, leaving 7 spaces below for the message "PRESS A KEY" as indicated by line 220 from the GOSUB in line 70.

Line 200, itself, rings a buzzer which is used to draw attention to a request on the screen.

Similarly, the pictures called CREDITS, RABBITS and BUGS are all loaded and displayed similarly.

Lines 120 and 140 contain the GET command which waits for a Key press before commencing with the program.

Line 170 leaves the HELLO program and goes to the actual problem in this exercise. (This program is called TAGGED.)

Figure 3. Listing of Hello Program

```
SYNTAX ERROR
]LIST

10   REM  HELLO PROGRAM
20   D$ = CHR$ (4)
30   PRINT D$ "BLOAD TITLE PAGE"
40   GOSUB 180
50   GOSUB 200
60   CALL - 3100
70   GOSUB 220
80   PRINT D$ "BLOAD CREDITS"
90   GOSUB 180: FOR X = 1 TO 3000: NEXT X
100  PRINT D$ "BLOAD RABBITS"
110  GOSUB 180
120  GET A$: PRINT A$
130  PRINT D$ "BLOAD BUGS"
140  GOSUB 180: GET A$: PRINT A$
150  TEXT:  HOME
160  VTAB 12: HTAB 12: PRINT "GOING TO PROBLEM..."
170  PRINT D$ "RUN TAGGED": REM  GOES TO PROBLEM
180  POKE - 16302,0: POKE - 16297,0  POKE - 16304,0: REM
     DISPLAYS HIRE  S PAGE 1
190  RETURN
200  FOR X = 1 TO 4000: NEXT : FOR A = 1 TO 15:BUZZ = PEEK
     (49200): NEXT : REM BUZZER
210  RETURN
220  HOME : VTAB 24: INVERSE : HTAB 14: PRINT "PRESS A KEY":
     NORMAL
230  GET A$: PRINT A$
240  RETURN
```

The problem in this activity allows the student to "Recapture" a choice of 15 to 40 rabbits after the computer has "Released" a random sample of tagged ones. The HIRES picture in Figure 4 explains the reasoning behind the "Release/Recapture" technique in sampling wildlife and the role of computers in this process and provides the formula used. Figure 5 is a HIRES picture showing a complete calculation. This picture may be retrieved by the student as many times as he or she wishes. The student is given three chances to accomplish the problem and then the answer is posted on the screen. Another problem is provided upon demand.

To prevent students from listing or changing any part of the program, this line in the HELLO program will accomplish this:

```
5 POKE 214,255
```

Summary

A good deal of software to support computer assisted instruction is available. But if an instructor wishes to build software programs tailored specifically for his or her uses, it can be done with the techniques described in this publication.

Figure 4. The Release/Recapture Method

In wildlife management, it is often difficult to count animals. So a technique known as

release/recapture is used. A known number of tagged animals is released into the study area. A sample is taken later which includes both wild and tagged animals. A ratio of tagged recaptured to wild captured animals is compared to the whole group of tagged released and wild animals. The population of wild creatures is determined with this formula:

$$\frac{\text{Tagged Released}}{\text{Unknown Wild (x)}} \times \frac{\text{Tagged Recaptured}}{\text{Wild Captured}}$$

The computer will release a random number of rabbits that are tagged into the woods. You will recapture a sample from 28 to 40 rabbits and use the above formula to determine X.

♦press a key♦

Figure 5. Sample Calculation

Sample Calculation:

1)RECORD THE NUMBER OF ANIMALS THAT WERE RELEASED (by the computer) INTO THE WOODS.
2)COUNT THE NUMBER OF TAGGED AND WILD ANIMALS FROM YOUR SAMPLE (recaptured ones).
3)USE THIS FORMULA TO DETERMINE THE POPULATION OF WILD ANIMALS:

$$\frac{\text{Tagged Released}}{\text{Unknown Wild (X)}} \times \frac{\text{Tagged Recaptured}}{\text{Wild Captured}}$$

i.e., $\frac{25}{X} \times \frac{3}{18}$ or, $(25 \times 18) = 3X$ or, $\frac{450}{3} = x$

or x = 150 [PRESS A KEY]

Nominations Open

Nominations are now open for the Conservation Teacher of the Year Award. The first prize will be $1000 cash to the national winner and an expense paid trip to Little Rock, Arkansas. Second prize is $500 cash to the runner-up at the national level. Regional and state recognition and awards will also be given.

Nominations are open to any teacher in grades K-12 who has initiated and continued an effective conservation education program.

For additional information and nomination forms, write or call: Robert Briggs, Science Specialist, Office of Public Instruction, Room 106, State Capitol, Helena, MT 59620. (444-4439).

Results from the balloon launch last May during National Science Week are in. The longest distance traveled was 700 miles from Portland, Oregon, to Billings, Montana. Participating teachers have sent cards that their students released with the balloons so that results can be analyzed.

Coming Attractions

Russ Hartford and Gary Freebury are looking forward to putting on four more *Science Safety Seminars* this spring. They will be held at Thompson Falls, Lewistown, Malta and Glendive. The dates have not yet been set pending grant approval.

. . . . . .

The Montana Section of the American Chemical Society would like to remind you that the American Chemical Society will again sponsor a U.S. team in the International Chemistry Olympiad in 1987. The International Chemistry Olympiad involves high school chemistry students from approximately twenty countries, who compete in both theoretical and laboratory examinations over several days. This year the Olympiad is to be held in Veszpren, Hungary in July.

All Montana chemistry students are eligible to take the General Chemistry exam in February. Letters and exams will be sent to all high schools in February seeking those who wish to participate. In March the top 50 students from the state will take the Montana ACS local exam. The top five from that exam will be invited to Montana State University during High School Week to take the National Qualifying Exam. The top 20 students from the U.S. will spend 2 weeks at the U.S. Air Force Academy where five will be chosen for the International Competition.

For more information contact: Gary Freebury or Russ Hartford, Flathead High School, Kalispell, MT 59901

hm Science Study Skills Program

* Are you looking for training to meet the state requirements for staff development in science?

* Would you like to recive inexpensive or free copies of a nationally acclaimed science program for use in grades 7-10?

* Can you spare only 2 or 3 hours for curriculum training?

Then don't miss the 1987 hm Science Study Skills workshops!

The hm Science Study Skills Program is a widely accepted curriculum developed by the National Science Teachers Association and the National Association of Secondary School Principals. The program provides youth in grades 7-10 with practice in using science study skills through a series of 14 activity-oriented energy units. Students will receive instruction in the following study skills: listening, reading for meaning, problem solving, work in scientific notation, and developing and testing hypotheses.

The hm Science Study Skills Program will be offered to Montana teachers through a series of free workshops to be held between January and May 1987. These workshops will provide participants with a free copy of the Science Study Skills Teacher's Guide and Student Text. Also, teachers will become familiar with the program and its integrated blend of study skills and energy topics. Teachers will receive additional information on how to apply for classroom quantities of the student test at little or no cost.

For more information contact: Peggy Nelson, Energy Division, Department of Natural Resources and Conservation, 1520 East Sixth Ave., Helena, MT 59620-2301 (444-6697).

4th Annual National Youth World of Water Pre-College Awards Competition and Conference

August 4-8, 1987

The National Youth World of Water Awards are again sponsored by the National Marine Educators Asssociation (NMEA). Winners of local, state, regional, national or international science fairs are invited to submit their marine/aquatic science project for judging. Eligible students are those in grades 9-12 during the 1986-87 academic year and who are winners in local, state, national or international science fair competitions.

Please submit a World of Water entry form which will include project summary (hypothesis, methodology and results); a Certification of Award from cognizant Science Fair officials; photo of science fair project. Caution: for experiments on living animals, a letter from the supervising teacher must accompany submission certifying the experiment was conducted under proper (humane) conditions. For experiments involving anesthetic drugs, pathogenic organisms, ionizing radiation, carcinogens or surgical procedures, a letter from a biomedical scientist must accompany the submission certifying that the experimentor followed proper procedures.

The entry deadline is May 1, 1987.

For entry forms or to submit entries write to: Vicki Osis, OSU Marine Sciences Center, Newport, OR 97365.

NEWS FLASH

Preliminary negotiations with the National Science Foundation have resulted in verbal confirmation of a $475,000 award to MSTA. MSTA is the submitting organization for the "Better Elementary Science Teaching" (B.E.S.T.) project. Watch for further details in the next newsletter and flyers that will be sent to your schools.

Ask Doctor Science (the Montana version)

Gil Alexander reports reading Dr. Science's *Big Book of Science,* simplified. Now Gil knows as much as Dr. Science. Gil also has a master's degree in geology, a discipline recently recognized as "science."

Montana Academy of Science

The 1987 Annual Meeting of MAS will be held at Eastern Montana College April 3-4, 1987. We look forward to a good program and urge you to attend. Our spring MSTA meeting will be held in conjunction with MAS as usual. If you plan to present a paper, contact Dr. Paul Sawyer, Exec. Sec., Montana Academy of Science, Dept. of Biology, Montana Tech, Butte, MT 59701.

The MSTA is an affiliation of the MAS and we strongly urge your active support of this excellent Montana science organization.

Make Them Think

It is natural for science to change continuously. As biology teachers we realize this, yet often we do not portray biology as a dynamic subject.

There are good examples of change in biology—acceptance of Peter Mitchell's chemiosmotic hypothesis and the recent changes in ecological theory come readily to mind. In the near future we should see some rather dramatic revisions of several other theories as well (e.g., the concept of plant "hormones"). Information about these new theories will appear often in *The American Biology Teacher.*

We all do our best to modify our memories and our courses to include recent advances in biological knowledge. Yet, while we appreciate the changing nature of biology, at times we do not transmit our appreciation for it to our students. We give students lists of definitions to memorize, laboratory exercises with results that the students are "supposed" to get, etc. Many of these activities have intrinsic merit—students must learn the vocabulary of biology and observe biology firsthand for themselves. But they must also discover that what they learn today may be incorrect tomorrow. Students should be somewhat uncomfortable about what they "know" and aware that biology is an approximation of the real world compiled from imperfect observations and incomplete information.

What can we do to stimulate an appreciation for the *science* of biology?

- *We can do laboratory exercises with unknown results.* Use different organisms and/or conditions—tell the students you don't know how the experiment will turn out, and that you expect them to explain their data to you.
- *We can challenge students.* Tell them that Smokey the Bear is a propaganda campaign and that television "nature" shows are often carefully staged. Ask for the students' ideas about these suggestions. Try to instill a healthy skepticism in your students, for skepticism is extremely important in science.
- *We can admit our own ignorance and show students where their textbooks are incorrect.* Demonstrate to the students that there is no "final authority" in biology.
- *We can prepare exams that stress thinking.* Give students observations and ask for explanations. Ask "how" and "why" questions, rather than "what" questions. Examinations are one of our most powerful tools for reinforcing learning. If we don't test for, and reward, understanding and critical thinking, then we should not pretend that we are teaching effectively.
- *We can stress that biological science is a process, not a collection of definitions or a list of dogmas.* Our findings may be fascinating, but how we found them is the issue.

As biology advances and has a greater impact on society through new technologies, it is up to us to prepare future biologists and well-educated citizens who understand how biology really works.

Dan Wivagg, *Associate Editor*
Randy Moore, *Editor*

This editorial appeared in the September 1985 issue of *The American Biology Tacher.* It was cited by the Washington Education Press Association and the Educational Press Association of America with Distinguished Achievement Awards for excellence in educational journalism in 1986.

Newton's Apple Freeware from DuPont

Bob Briggs has a master copy of new, free Apple II software that is a part of the fourth season of Newton's Apple, the award-winning PBS science series.

If you want a copy, please send two formatted disks to Bob Briggs and he will copy the information onto your disks and return them.

Send disks to: Bob Briggs, Science Specialist, Office of Public Instruction, State Capitol, Helena, MT 59620.

25th Intermountain Junior Science and Humanities Symposium

The 25th Intermountain Junior Science and Humanities Symposium will be held at the University of Utah, February 25-28, 1987. This program is for high school students and their science teachers and is concerned with research in science related areas. A preliminary selection process has identified 25 delegates from the state of Montana. In addition, five teachers will receive funding for the symposium. Several others have been invited as extra delegates, but must pay their own expenses.

Those students and teachers selected are: Sunburst—Lowell Bye, Kurt Bush, Cristi Heavirland, Amy Ryan, Ernie Lee, Tom Nau, Melissa Taylor and Larry Fauque, teacher; Browning—Sengua Hernandez, Roylene Doore, Cuauhtli Hernandez, Jo Ann Weber, Hilary Roy and Creighton Steiner, teacher; Missoula Sentinel H.S.—Robert Rudloff-Speckle, Kristin Lavery, Nadine Goggin, Laurie Porter, Karl Boehm and James Cusker, teacher; Missoula Big Sky High School—Christiana M. Norby, Brian Tabert, Kelly Minske and Jim Harkins, teacher; Big Sandy—Colleen Keller, John Cavitt and Gaye Genereau, teacher; Helena High—Kathryn K. Wyard; from Helena Capital—Simone Tauberberger; and from Deer Lodge—Amy L. Sulliman.

Your Future...Awesome

NASA and NSTA Announce Expansion of Space Science Student Involvement Program

Each year, the National Science Teachers Association (NSTA), in conjunction with the National Aeronautics and Space Administration (NASA), sponsors and conducts the Space Science Student Involvement Program (SSIP). The SSIP has now been expanded to four separate competitions open to regularly enrolled secondary school students in all public, private and parochial schools nationwide, including U.S. civilian and military schools overseas, in Guam, Puerto Rico and the outlying U.S. territories.

The Space Station Project gives students (grades 7-12) the opportunity to design experiments which might be conducted aboard the proposed space station. Regional and national winners, selected from grades 7-9, along with their teacher/advisors, will receive special awards of recognition. For students grades 10-12, up to five winners from each of seven geographic regions and their teacher/advisors will be awarded an expense-paid trip to a special space symposium conducted at a NASA research center in April 1987. Up to seven national winners will be selected from these regional winners. They and their teacher/advisors will go on to attend a National Space Symposium, where NSTA will award scholarships.

New this year is the additional opportunity for students (grades 10-12) to propose experiments suitable for implementation in the Zero Gravity Research Facility at NASA's Lewis Research Center in Cleveland, Ohio and the wind tunnel at NASA's Langley Research Center in Hampton, Virginia. The Zero Gravity Facility is used to simulate the microgravity effects of space on liquids, gases and combustion for short periods of time. The large open-throat test section of NASA's wind tunnel allows large-scale aircraft models to be tested for aerodynamic performance, power effects, wing pressure distribution and flow distribution. Small-scale models can be tested for both static and dynamic aerodynamics. One national winner from each competition along with his/her teacher/advisor will receive awards for their school and an educational visit to a NASA research center.

A fourth award is for the Student Newspaper Competition. This award gives students (grades 7-12) the opportunity to demonstrate their journalistic skills by writing a promotional advertisement or article in their school newspaper about the 1986-87 Space Science Student Involvement Program. To qualify, all promotions must be published in the school newspaper by February 1, 1987. One winner and his/her newspaper advisor will receive an expense-paid trip to a National Science Symposium.

All entries must be postmarked by March 15, 1987.

For more information and competition guidelines, please write to: Bob Briggs, Science Specialist, Office of Public Instruction, State Capitol, Helena, MT 59620.

American Association of Physics Teachers

The Montana Section of AAPT (MSAAPT) will hold its annual spring meeting in conjunction with the Montana Academy of Sciences (MAS) at Eastern Montana College on April 3-4, 1987. If you have a short presentation about science teaching that you would like to make, please contact Linda Robinson, MAS Vice President for the Teaching of Science and Mathematics Section, 4408 Pine Cove Road, Billings, MT 59106. MSAAPT plans to hold a special session for sharing physics lecture demonstrations. If you wish to present your favorite demo, contact Lindsay Hess, Mathematical Sciences, Montana Tech, Butte, MT 59701.

If you would like to join with other teachers in promoting the teaching of physics, please join MSAAPT by sending $5 along with your work and home addresses and telephone numbers to Larry Kirkpatrick, Physics, Montana State University, Bozeman, MT 59717.

The AAPT annual summer meeting will be held in Bozeman on June 15-19, 1987. Mark these dates on your calendar as this is a golden opportunity to interact with physics teachers from around the United States.

Soviet officials have named two craters on Venus in honor of Christa McAuliffe, first teacher in space, and Judith Resnick, U.S. astronaut.

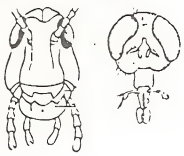
1987 *Science Essay Awards Program* sponsored by DuPont, Biology Bulletin Monthly and NSTA provides cash and travel awards to students in grades 7-12 and their teachers. Entries must be papers identifying a significant scientific or technological development that has contributed to society. Deadline: January 15, 1987. For more information, call General Learning Corporation, 1-800-323-5471.

Ever Ready Insects

by Judy Lachvayder
Parma Sr. High School
Parma, Ohio

Animal diversity, structural adaptations and homologous structures can easily be studied with the aid of insects. Unfortunately in our climate, insects are not collectable, except for a few brief weeks in the beginning and end of the school term. Insects collected at this time, or during the warm summer months when their populations peak, can, however, be stored indefinitely in an Arthropod Fixative and Preservative that leaves them soft and pliable. Students are fascinated to observe insects under a stereoscope or hand lens, and to be able to manipulate the legs, wings and mouth parts with minimal fear of breaking off the structure makes it even more fascinating. I especially like to have students compare and contrast mouth parts and other structures of the insects to determine how they obtain nutrients. Insects can chew (grasshoppers), pierce and suck (mosquitoes and bugs), siphon (butterflies), lap (bees), or sponge (fly) their food.

What would you feed these insects?



To make 1.0 liter of Arthropod Fixative and Preservative, combine 750 ml of ethanol, 50 ml of glycerine, and 200 ml of distilled water. A pinch of coloring material such as methyl orange may be added to enable the collector to distinguish it from other preservatives used in the field. The glycerine protects the specimen in the event the alcohol evaporates from the storage container. The glycerine also keeps the joints freely flexible. Isopropyl (rubbing) alcohol or methanol can be substituted for ethanol. This solution may be used for killing, fixing and permanently storing invertebrates having firm exoskeletons but should be used with caution in fixing the soft-bodied because of possible distortion due to dehydration.

Physics and Automobile Safety Belts

The purpose of this book is to convince physics students that the use of safety belts to prevent injury or death is firmly supported by physical laws, and that wearing safety belts while driving makes good sense. It is intended to serve as a supplement to a standard physics course and contains a collection of problems and experiments related to automobile safety belt usage.

The book is divided into sections according to major physical concepts-velocity, acceleration, momentum, impulse, force, torque, energy, and stress and strain. Each section may contain short classroom demonstrations (requiring 20 minutes or less), examples and problems, and laboratory experiments. The instructor may draw from these materials to design classroom or laboratory activities, to assign independent projects, to develop extra-credit or remedial assignments, or to construct quizzes and examinations. Students may use some of the materials to review for examinations.

The examples and problems are meant to be convincing mathematical demonstrations that safety belts should be worn every time one drives. Examples are generally more difficult problems. Almost every example and problem has some implication about safety belt use, and appropriate comments have been included as guides. Laboratory experiments are intended to give the student an intuitive feeling for the relevant physical principles and their application to collision situations.

Order from: Superintendent of Documents; U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 050-003-00254-2. Price $1.90.

Demonstrating Density

by Marten Taffel
Long Lots Junior High
Westport, Connecticut 06880

The concept of density is difficult for the average seventh or eighth grade student to understand. Most of the current physical science textbooks, however, include it as one of the characteristic properties used to distinguish between various materials. The following demonstration has proven useful in promoting inquiry discussions when the concept of the density is introduced.

Fill a large, clear glass cylinder, approximately 100 ml, one-third full with a saturated salt solution. Laboratory grade NaCl will keep the solution clear. Place a golf ball in the salt solution and then carefully pour fresh water down the side of the container until it is approximately two-thirds full. The result will be a golf ball, which has a greater density than fresh water but is less dense than salt water, floating in the middle of a clear liquid.

If the demonstration is visible as the students come into the classroom, the result is usually a high degree of interest and curiosity. Spin-off activities such as comparing various brands of golf balls in standardized solutions or investigating what causes the schlieren lines which result when the golf ball is pushed down with a glass rod and then released, may take several days.

(From The Masthead, Massachussetts Association of Science Teachers Newsletter, vol. 10, no. 2; January 1983)

Montana Science Teachers Association
Application Form

Name _____

City _____

County _____

Business Address _____

_____

_____

Home Address _____

_____

Grade Level	Grades Taught	Subject Area
☐ Elementary	_____	_____
☐ High School	_____	_____
☐ College	_____	_____

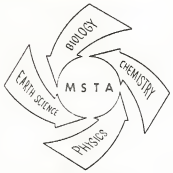
MSTA will help the individual participate in determining the destiny of science education in Montana. The organization serves as a vehicle for educators from all professions to exert positive influences on young people. Many important decisions concerning the scope and direction of science education will be strongly influenced by our organization.

The MSTA goals are to increase public awareness, interest and support of science education in Montana.

Membership Dues are $8.
Make checks payable to:

MSTA
Gil Alexander, Treasurer
Helena High School
Helena, MT 59601

Montana Science Teachers Association



Dedicated to quality science education

Office of Public Instruction
Ed Argenbright, Superintendent
State Capitol, Room 106
Helena, MT 59620